THE NIGER AND THE NILE: BOTANICAL EXPLORATION AROUND TWO AFRICAN RIVERS

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ABSTRACT

Knowledge of the plants of Africa has been obtained by exploration and taxonomic study. While west Africa is dominated by the River Niger, northeast Africa has the famous Nile, with its major branches of the White and Blue Niles. This paper outlines more than two centuries of botanical exploration by individuals and organizations in these regions, relating them to the colonial and governmental history of each period, and links the value of the knowledge gained to the environmental concerns of today.

The Niger and the Nile—the two great rivers of Africa north of the equator—lie to the west and east of the continent. For centuries even geographers thought that the Niger flowed out through Senegal, owing to the hidden nature of the Niger's debouchment with the Atlantic Ocean via a multitude of outlets in Nigeria; they also thought the Niger and the Nile had a common source in the Mountains of the Moon (Senex, 1721). The real source of the Nile, however, was a mid-eighteenth century objective as much sought after as a moon landing was in the mid-twentieth century.

If we look back on the past century we see that this time span encloses most of Africa's colonial period. Before the 1880s only a few, scattered European trading posts located along rivers, such as the Niger and Senegal, could be reached by ship. This situation was altered by the "scramble for Africa," starting with the Berlin West Africa Conference of 1884–1885, when European imperial powers scrambled to gain colonial possessions. By 1898 all of Africa except for Liberia and Abyssinia was carved up into colonies (see Fig. 1). Less than three-score-years-and-ten later, however, the colonies were becoming independent nations. Gold Coast became Ghana in 1957, and in quick succession other British and French possessions gained nationhood, with only Portuguese territories resisting until the 1970s.

Botanical exploration adapted to these changing conditions, and it is no accident that the main African herbaria were established in the imperial cities of London, Paris, Berlin, Brussels, and Lisbon, which were the capitals of Britain, France, Germany and Portugal, the states that controlled their African colonies.

PRELIMINARY EXPLORATIONS

Ever since the time of Henry the Navigator (1345–1460), when the Portuguese in the fifteenth century sent their caravels to explore coastal regions ever further around Africa, European nations sought the spices of the Far East, rather than conquest of unhealthy tropical Africa itself. Not until the eighteenth century were herbarium collections and serious botanical observations made. The first were the French, with Adanson in Senegal (in 1749–1754), and Palisot de Beauvois (in 1790) in Oware and Benin, which are now parts of Nigeria (Aubréville, 1962). The British Duchess of Portland sent the Dane Henry Smeathman to Sierra Leone to settle released slaves in 1771; William Brass was sent by Kew's Sir Joseph Banks to the Gold Coast in 1780 (although Keay [1962] stated that Brass actually collected more gold than plants). The Danes were early seafarers who established forts on Africa's west coast. It was from Christiansborg Castle in present-day Ghana that P. E. Isert and Peter Thonning made their important plant collections between 1783 and 1803. They set out to find medicinal herbs and to help the Africans create better farms to alleviate their poverty (Hepper, 1976, 1979a).

Virtually nothing was known of the natural history of northeast Africa until the second half of the eighteenth century (see Fig. 2). Two notable expeditions dramatically opened up the flora and

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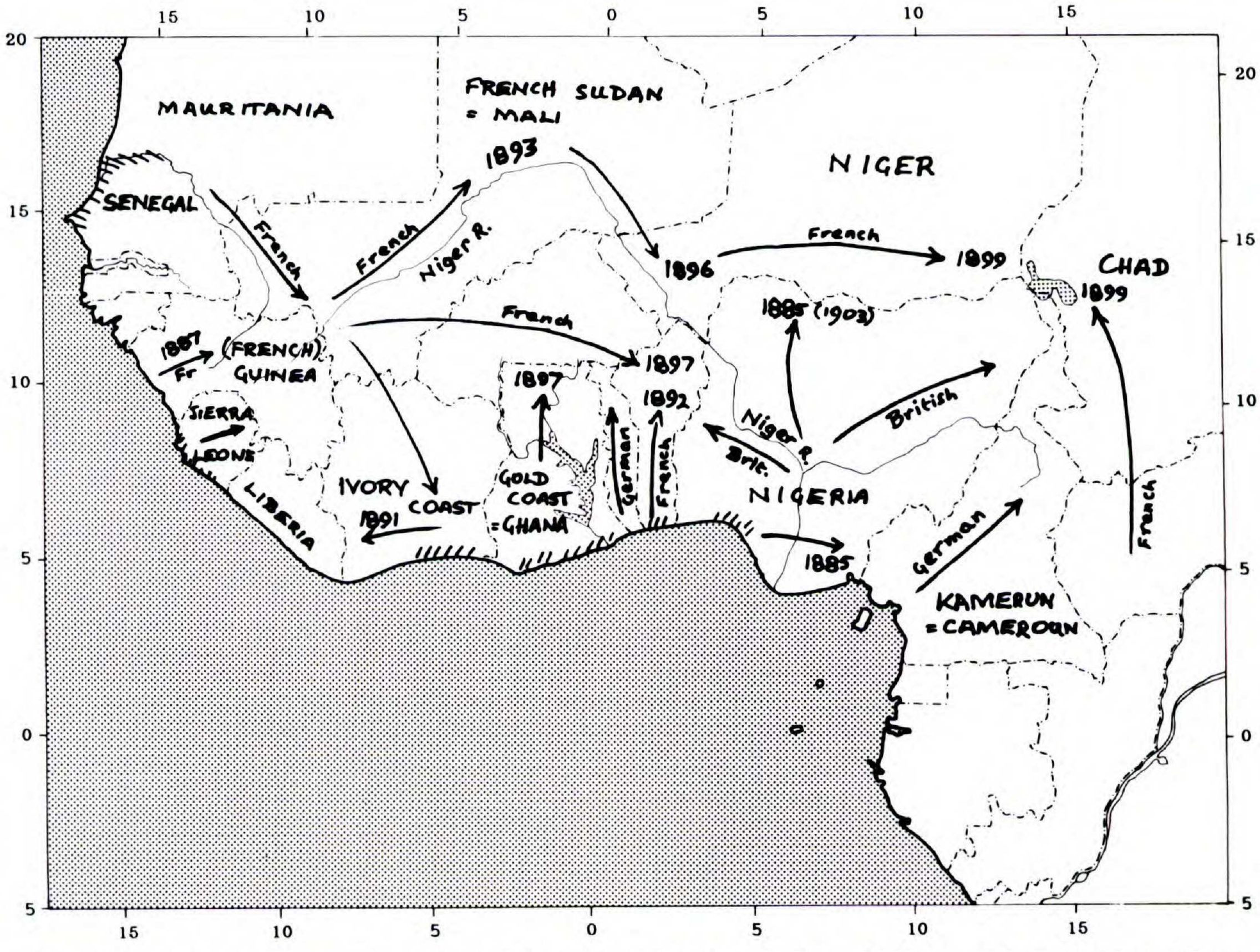

FIGURE 1. The Niger and West African colonization. (Based on J. Fage, 1978, *An Atlas of African History*, Edward Arnold, London.)

fauna by approaching the region along the Egyptian Nile and the Red Sea. The first was a royal Danish expedition with the botanist Peter Forsskal, who died in the Yemen in 1763. (I include this because many of the plants [and animals] he collected have an African distribution and affinity, rather than an Arabian one.) The sole survivor of this expedition, Carsten Niebuhr, sent back Forsskal's natural history collections to Copenhagen University. I am at present revising that important botanical material (Hepper, in prep.).

The other expedition was led by James Bruce to Abyssinia (now Ethiopia), which he reached in 1770 and about which he published his five-volume *Travels* (1790). This work included illustrations of 15 species of plants (the second edition of 1805 increased the number to 27), as well as engravings of some birds, mammals, and other creatures. Much has been written about this expedition to discover the source of the [Blue] Nile (Head, 1836; Moorehead, 1962), but little has been known about his companion Luigi Balugani. This Italian artist, who died in Gondar in 1772, had drawn more than 150 plants and many animals during this African expedition, some as superb finished water colors. Most had been overlooked until I worked on them at the Yale Center for British Art and realized that when Balugani drew them they were new species that remained unknown until later explorers collected them. At last Balugani takes his place, according to Paul Hulton, formerly of the British Museum, as a major eighteenth-century artist alongside John Parkinson of James Cook's voyage (Hulton et al., 1990).

The First Half of the Nineteenth Century

Napoleon's savants in Egypt included the botanist Delile (1809); further up the Nile, Bruce and Balugani were followed by Henry Salt (1832–1833) and more importantly by others including Quartin-Dillion and Petit in the 1830s, and the German W. P. Schimper, who lived in Abyssinia from 1837–1878 and who made large and important collections of plants. The Sudan was visited mainly by French (F. Caillaud in 1819–1822) and Italian (G. Raddi in 1827–1829) explorers (Cufodontis, 1962).

In West Africa, the early nineteenth century saw increasing numbers of expeditions, partly for

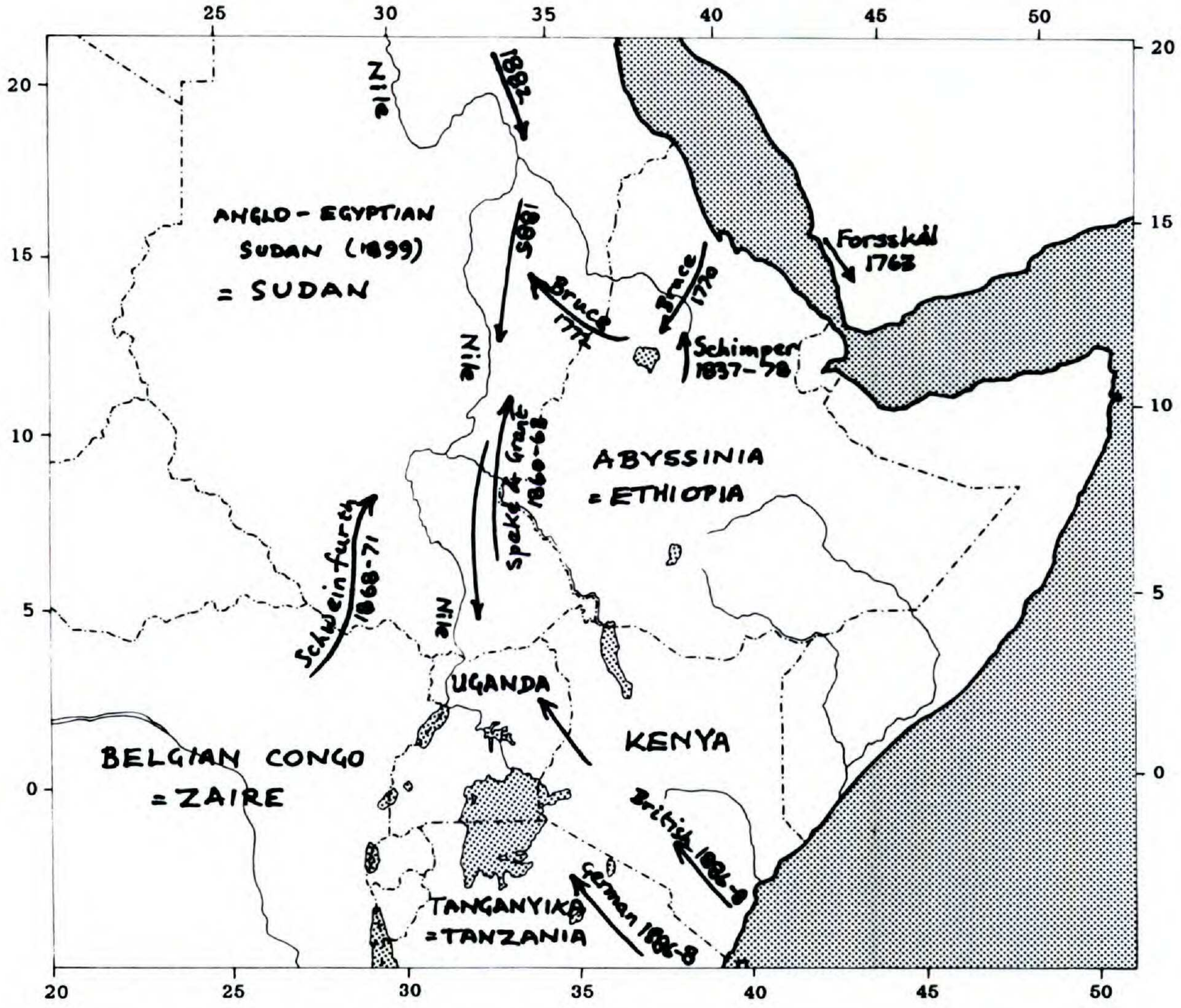

FIGURE 2. The Nile and East Africa. See text for explanation.

trading purposes and partly to resist the Portuguese slave trade; along on the ships went naturalists. In the 1820s and 1830s the French sent the botanists Perrottet, Leprieur, Richard, and Heudelot to Senegal, and their herbarium material was received at Paris. The British explorers, such as Mungo Park, who perished in the Niger in 1805, and Clapperton, who reached the Niger from the coast in 1826, collected few plants. An ill-fated expedition to the Niger in 1841 lost most of its crew because of disease. The botanist Theodor Vogel also succumbed, although he had collected many plants that found their way to Kew. Fortunately, the next expedition under Dr. W. B. Baikie in 1854 was equipped with quinine, which successfully controlled malaria. During Baikie's return visit to the Niger in 1857, however, his ship "Dayspring" wrecked at the Jebba rapids, and Charles Barter's herbarium collection was lost. Undaunted, Barter made friends with local chiefs and collected another 2,000 specimens in the vicinity while waiting for a replacement ship. He did not survive the two years required, however, and was in turn replaced by another Kew botanist, Gustav Mann (Hepper & Neate, 1971).

THE "HEROIC PERIOD" OF AFRICAN EXPLORATION

According to Gillett (1962), the "heroic period" extended in East Africa between 1860 and 1888, with famous expeditions such as those by Speke and Grant and the German explorations to Mt. Kilimanjaro led by Decken. Here I overextend my terms of "the Nile area" in East Africa. The 1886 Anglo-German agreement decided the spheres of influence of the trading companies, and the direct imperial administrations created the period of colonial establishment between 1888 and 1918 (Gillett, 1962). The British areas of Uganda and Kenya included the headwaters of the Nile at Lake Albert, while Lake Victoria impinged on German Tanganyika (see Fig. 2). Meanwhile in the north, following the British occupation of Egypt in 1882 and the Mahdist revolt in Sudan 1881–1898 (during which occurred the death of General C. G. Gordon in 1885), the joint Anglo-Egyptian Sudan was set up in 1899. This opened up the entire Nile to exploration, although in 1863 Samuel Baker had almost reached Unyoro (now Bunyoro in Uganda), and in the opposite direction Speke and Grant arrived at

Khartoum in 1863. Georg Schweinfurth's epic journey from Congo to Egypt (1866–1872) yielded a large collection for Berlin (Cufodontis, 1962; Gillett, 1962).

In between the Nile and the Niger, the French conquest of the Lake Chad region and the Shari and Ubangi river basins by Lamy and Archambault in 1899 linked equatorial Africa with French West Africa, but the Germans took Kamerun (Cameroon) eastward of British Nigeria. C. Ledermann was the botanist on the German Adamaua expedition through Cameroon from 1908 to 1909, during which he collected 6,492 plants. Unfortunately, few duplicates were distributed and most were later destroyed in Berlin during World War II (Hepper, 1974). Fortunately, many of G. W. J. Mildbraed's Cameroon collections are represented in other major herbaria and were included in Letouzey's (1963) *Flore du Cameroun*, which itself has provided an incentive for further biological exploration.

Nigeria had seen an amalgamation of trading companies in 1879; by 1897 Nigeria was taken somewhat reluctantly under the British crown, and military expeditions pushed north to Sokoto declaring it a Protectorate. In the meantime (1879–1893), the French military had made rapid advances from Senegal eastward through the Sudan country under the asssumption that the most advanced and productive parts of West Africa lay there. Thus, the British and French forces met, and defining territorial limits was necessary to avoid disputes. It was during boundary commissions, such as that between Sierra Leone and French Guinea (1891–1892) on which G. F. Scott-Elliot was able to collect plants for Kew, that serious botanical investigations took place.

In the 1860s the director of the Royal Botanic Gardens at Kew, Sir William Hooker, had initiated the plan for the *Flora of Tropical Africa* as one of the proposed series of colonial floras detailing the plant life and potential products of the British Empire. With hindsight one cannot help but be amazed that such an undertaking was started when so little was known about the interior of Africa, yet it was a significant work that continued until 1937. The preparation of this 11-volume work must have stimulated botanical exploration and the collection of herbarium material, as did the first edition of the *Flora of West Tropical Africa* by J. Hutchinson & J. M. Dalziel during the 1920s and 1930s.

First Half of the Twentieth Century

By the twentieth century in both West and East Africa botanical studies began to be made by residents based in departments or offices. In 1908, H. N. "Timber" Thompson founded the Gold Coast Forest Department and soon afterward became superintendent of forests at Lagos (W. Nigeria), where he designated forest reserves. In 1892, the Germans established a botanical garden on the Cameroon coast at Victoria where Dr. P. R. Preuss studied the flora; in Tanganyika in 1902 the Germans founded a herbarium at Amani (which much later was transferred to Nairobi's East African Herbarium). Botanical exploration of the Anglo-Egyptian Sudan for British Museum (Natural History) collections resulted in Andrew's *Flora* (1950–1956). In Egypt, the Swede Vivi Tackholm and her Egyptian colleague Mohamed Drar published four volumes of their *Flora of Egypt* (1941–1969), which was never completed.

From 1899 to the 1930s the notable and energetic Auguste Chevalier sponsored West African botany in the French territories, and he amassed a huge collection at the Paris herbarium. He was followed by another of similar stature, André Aubréville, who published much including an illustrated, three-volume *La Flore forestière de la Côte d'Ivoire* in 1936.

Second Half of the Twentieth Century

Since the Second World War, increasingly more African nationals have become involved in botanical exploration. Following the war, institutes of higher learning and research stations with herbaria were established and were linked by motorable roads. Roads had a counterproductive effect on plant collecting as well, as it became increasingly difficult to travel *off* the roads! Porters were expensive or unprocurable, and the scatter of rest houses about a day's walk apart fell into disuse in favor of hotels or lodges at wide intervals along the roads. On the positive side, resident government officers were able to settle down to extended study of large or small areas. Some notable collections have been made by amateurs, including wives of officials posted to out-of-the-way places—the best known is Mary Richards, who lived in Zambia outside our area of consideration. Others such as Mrs. Faulkner in Tanzania and Mrs. Tweedie in Kenya were good correspondents of Kew. Controlling governments, and later aid donors, sent missions to regions to report on the forestry, pasturage, geology, and so forth, which resulted in large collections of often, regrettably, inadequate specimens. Local herbaria were active in identifying material, usually in cooperation with Kew or Paris. Thus in Sierra Leone, F. C. Deighton's study of pathogenetic fungi resulted in the formation of

an excellent agricultural herbarium at Njala. In Ghana the Forestry Herbarium at Kumasi was under the erudite, self-taught A. A. Enti, who transferred to the University of Ghana and there built up a much larger and active herbarium under C. D. Adams, J. K. Morton, and J. B. Hall. In Nigeria the largest herbarium is still at the Department of Forest Research in Ibadan, which was very active under R. W. J. Keay, who helped prepare *Nigerian Trees* (1960–1964). As well as collections by resident botanists, exploration by visitors continued for general collections like my own to remote parts of northern Nigeria (1957–1958) and from Senegal to Lake Chad by hovercraft along the River Niger (1969) for the revised edition of the *Flora of West Tropical Africa*. Specialist collecting gradually increased again with fine work by F. White (Ebenaceae); D. J. Mabberley of Oxford (mountain flora); O. Hedberg of Uppsala (mountain flora); R. M. Polhill of Kew (Loranthaceae); C. Grey-Wilson of Kew (*Impatiens*); B. L. Burtt of Edinburgh (Gesneriaceae); and many others. The Association of African Taxonomists (AETFAT) has done much to channel and coordinate such studies and explorations, and they have collaborated on publications such as their Index (Léonard, 1954–) and vegetation maps (Keay, 1959; White, 1983).

The tremendous burst of activity after independence from colonial rule was badly hit by the rise of oil prices in the 1970s, the slump in oil demand in the 1980s, and inflation generally. Foreign currency was unavailable for botanical journals and equipment, fuel, and even food. For example, in Nigeria and Ghana most activities were suspended for many years, yet J. B. Hall & M. Swaine (1981), with D. Abbiw's help, managed to make a study of Ghana's tropical forests that is probably the most comprehensive of any in the world. An active center in the Ivory Coast has continued under Professor L. Aké Assi. In Kenya, Christine Kabuye, following J. B. Gillett and colleagues, collaborated with Kew on the *Flora of Tropical East Africa* (Turrill et al., 1952–). Exploration of Ethiopia continued sporadically (Cufodontis, 1962), but the recent incentive by the founding of a flora project (Hedberg & Edwards, 1989) has meant concerted efforts by many international expeditions, unfortunately at a time when the vegetation is already decimated.

Future of the Environment

The present international awareness of and concern for the environment at last involves governments and donor organizations. They now begin to realize that tropical rainforests are crucial not only to the economy of African countries, but also to the well-being of the biosphere. Overseas aid is partly being directed toward conservation instead of development in the old sense—that of cutting down "the useless bush" in order to establish a plantation. Since the ancestors of the plantation crops occur in the bush, developers now realize that it is not useless after all. This gives added impetus to exploration of the vegetated habitats and the investigation of their constituent species.

Joint projects with zoologists, the World Wide Fund for Nature, and other donors in cooperation with national governments are concentrating exploration and research on special areas, for example, Gola Forest (Sierra Leone), Sapo National Park (Liberia), Tai Forest (Ivory Coast), Ankasa Forest (Ghana), Oban Forest (Nigeria), and Korup National Park (Cameroon). One project with which I have been concerned since its inception in 1986 is the Limbe Botanic Garden project for the conservation of genetic resources of associated rainforests on Cameroon Mountain. This project is supported financially by the British Overseas Development Administration and the Cameroon government and is linked with the Royal Botanic Gardens, Kew. It is refurbishing the old German garden at Victoria (now Limbe) as the administrative and research base for the species-rich forested areas (Hepper, 1989). Another project concerns the Missouri Botanical Garden. For more than a decade significant discoveries have been made by stationing plant collectors in strategic places, such as Korup in Cameroon where Duncan Thomas gained unrivalled knowledge of the flora and made many additional records. Other Missouri collectors elsewhere in Africa are making this herbarium America's major one for tropical African study. This may be the pattern for the future—international cooperation at various levels.

Concluding Remarks

Published maps (Léonard, 1965; Hepper, 1979b) show large gaps in the cover of botanical exploration in some African countries, such as Cameroon and Gabon. In Gabon, Breteler (1990) estimated that only 40,000 herbarium specimens have been collected thus far in a tropical forest covering a quarter of a million square hectares, and probably only 75% of the species are described. (Owing to general deforestation in Africa one may ask whether they will ever be known before they are destroyed.) By contrast, Ghana is now so well known that few additional species are likely to be found. Little is still known of the ecology or biology of most tropical species, and this is where future field

studies must concentrate (Hawthorne, 1990). Exploration of, say, the tree canopy to study epiphytes or the study of insect pollination may not be as hazardous a quest as the old Niger and Nile expeditions, yet we must find out what sustains plant life, or human life will be unsustainable on this planet.

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